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10/617,469	07/10/2003	Kathiravan Krishnamurthi	55123P267	3248

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EXAMINER	
CHOW, CHARLES CHIANG	

ART UNIT	PAPER NUMBER
2618	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/617,469	KRISHNAMURTHI, KATHIRAVAN	
	Examiner	Art Unit	
	Charles Chow	2618	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *28 March 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-24* is/are pending in the application.

4a) Of the above claim(s) *8,9 and 24* is/are withdrawn from consideration.

5)☒ Claim(s) *25-27* is/are allowed.

6)☒ Claim(s) *1-7, 10-23* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

Detailed Action

1. This office action is for amendment received on 3/28/2006.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1, 10, 13, 17, 20, 22-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakano (US 5,960,334) in view of Jin et al. (US 6,904,266 B1).

Regarding **claim 1**, Nakano teaches a local oscillator circuit [Fig. 1] comprising

a first LO source to generate a first periodic signal cycling at a first frequency [the first period signal cycling at 800 MHz of a first local oscillator source 4, Fig. 1, col. 4, lines 2-40],

a second LO source to generate a second periodic signal cycling at a second frequency different than said first frequency [the period signal cycling at 1600 MHz of a second local oscillator source 5, Fig. 1, col. 4, lines 2-40],

a limiter [the amplification circuit between switch 23 & mixer 3, Fig. 1, col. 4, lines 2-40 & col. 5, lines 20-35; for amplifying selected local oscillator frequency of 800 MHz, according to the switched capacitance as-sociated with switch 35, to provide greater gain for 800 MHz than the gain for 1600 MHz, to isolate the leakage signal of second LO source 1600 MHz, which is equivalent to the limiter described in applicant's specification, the providing of large gain to amplify for a selected LO signal in order to isolate the unselected LO signal, applicant's specification, paragraph 0008 in page 3 & paragraph 0026 in page 6];

a first switch element [23] to selectively couple said LO source [4] to said limiter [the amplification circuit between switch 23 and mixer 3, Fig. 1];

Nakano fails to teach a second switch element to selectively coupled said second LO source to said limiter.

Jin et al. (Jin) teaches these features [a transmitter 20 comprising a second switching element 74 to selectively coupled said second local oscillator LO2 to an amplifier A3 or A4, col. col. 7, lines 1-20, Fig. 7], in order to attenuate the signal leakage [col. 2, lines 34-40]. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Nakano with Jin's second switch element 74, in order to provide isolation of the signal leakage from the unselected LO signal.

Regarding **claim 10**, Nakano teaches a receiver [Fig. 1, col. 3, lines 58-65] comprising

a mixer 3 to down convert a received rf signal to an IF signal [Fig. 1]; and

a local oscillator circuit [Fig. 1] coupled to said mixer 3, wherein said LO circuit comprising:

a first LO source to generate a first periodic signal cycling at a first frequency [the first period signal cycling at 800 MHz of local oscillator 4, Fig. 1, col. 4, lines 2-40],

a second LO source to generate a second periodic signal cycling at a second frequency different than said first frequency [the period signal cycling at 1600 MHz of local oscillator 5, Fig. 1, col. 4, lines 2-40],

a limiter [the amplification circuit between switch 23 & mixer 3, Fig. 1, col. 4, lines 2-40 & col. 5, lines 20-35; for amplifying selected local oscillator frequency of 800 MHz, according to the switched capacitance associated with switch 35, to provide greater gain for 800 MHz than the gain for 1600 MHz, which is equivalent to the limiter described in applicant's specification, to provide large amplification for a selected LO signal in order to isolate the unselected LO signal, applicant's specification, paragraph 0008 in page 3 & paragraph 0026 in page 6];

a first switch element [23] to selectively couple said LO source [4] to said limiter [the amplification circuit between switch 23 and mixer 3, Fig. 1];

Nakano fails to teach a second switch element to selectively coupled said second LO source to said limiter.

Jin teaches these features [a transmitter 20 comprising a second switching element 74 to selectively coupled said second local oscillator LO2 to an amplifier A3 or A4, col. col. 7, lines 1-20, Fig. 7], in order to attenuate the signal leakage [col. 2, lines 34-40]. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Nakano with Jin's second switch element 74, to provide isolation of the signal leakage of the unselected LO signal.

Regarding **claim 13,** Jin teaches a low noise amplifier LNA 32 to amplify said rf signal, wherein an output of said LNA is coupled to an input of said mixer [34, Fig. 7].

Regarding **claim 17**, Nakano teaches a transmitter [the amplifying local oscillator signal of a carrier signal of a transmitter section of a portable telephone, Fig. 1, col. 1, lines 4-9],

a transmitter comprising an mixer 3 to upconvert an intermediate frequency IF signal [signal to mixer 3] to a RF signal [rf signal to antenna 1, for transmission, col. 5, lines 45-55],

a first LO source to generate a first periodic signal cycling at a first frequency [the period signal from VCO frequency 800 MHz of local oscillator 4, Fig. 1],

a second LO source to generate a second periodic signal cycling at a second frequency different than said first frequency [the period signal from VCO frequency 1600 MHz of local oscillator 5, Fig. 1, col. 4, lines 2-28],

a limiter [amplification circuit between switch 23 & mixer 3, Fig. 1, col. 4, lines 2-28; for amplifying selected local oscillator frequency of either 800 MHz or 1600 MHz, according to

the position of switch 35 incorporation with position of switch 23, which is equivalent to the limiter described in applicant's specification, to provide large amplification for a selected LO signal in order to isolate the unselected LO signal, applicant's specification, paragraph 0008 in page 3 & paragraph 0026 in page 6];

a first switch element [23] to selectively couple said LO source [4] to said limiter [the amplification circuit between switch 23 and mixer 3, Fig. 1];

Nakano fails to teach a second switch element to selectively coupled said second LO source to a amplifier.

Jin teaches these features [a transmitter 20 comprising a second switching element 74 to selectively coupled said second local oscillator LO2 to amplifier A3 or A4, col. col. 7, lines 1-20, Fig. 7], to attenuate the signal leakage [col. 2, lines 34-40]. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Nakano with Jin's second switch element 74, to provide isolation of the signal leakage of the unselected LO signal.

Regarding **claim 20**, Jin teaches a power amplifier [PA] to amplifier said rf signal wherein an input of said power amplifier is coupled to an output of said mixer [42, Fig. 1].

Regarding **claim 22,** Jin teaches an rf filter to remove undesired signals from rf signal [the filter after PA before B in Fig. 1].

Regarding **claim 23,** Jin teach an IF amplifier to amplify said IF signal [the IF AGC2 in Fig. 2].

3. Claims 2-3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakano in view of Jin, as applied to claim 1 above, and further in view of Yamao et al. (US 5,231,632).

Regarding **claim 2**, Nakano& Jin fail to teach the wherein said first and/or second switching element comprising transistor. Yamao et al. (Yamao) teaches the switches SW1, Sw2 for switching local oscillators 15A, 15B, the SW1, SW2, are FET transistors, GaAsFET transistors [Fig. 6, col. 7, lines 48-63; col. 7, lines 19-47], in order to minimize switching time for handoff [col. 7, lines 55-63]. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Nakano & Jin with Yamao's GaAsFET transistor switch, in order to minimize switching time for handoff.

Regarding **claim 3**, Yamao teaches wherein said transistor comprises a field effect transistor [the utilizing GaAsFET transistor for switches, col. 7, lines 55-63].

4. Claims 4, 11, 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakano in view of Jin, as applied to claims 1, 10, 17 above, and further in view of Dexter (US 6,654,595 B1).

Regarding **claims 4, 11, 18**, Nakano teaches a limiter & first switching element, Fig. 1. Jin teaches a second switching element 74. Nakano & Jin fails to teach the transformer coupled to said limiter, wherein said transformer comprises first and second differential transformer outputs.

Dexter teaches the transformer 302 receiving LO input in Fig. 3, the transformer different outputs is coupled to the limiter 130 square wave regenerator 130 [Fig. 3, col. 13, lines 13-27], to reduce the harmonic distortion [col. 4, line 61 to col. 5, line 8]. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Nakano & Jin with Dexter's differential transformer output to limiter square wave generator to drive mixer, in order to reduce the harmonic distortion.

5. Claims 5-7, 12, 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakano in view of Jin, Dexter, as applied to claims 4, 11, 18 above, and further in view Souetinov (US 6,211,718 B1).

Regarding **claims 5, 12, 19**, Nakano teaches a limiter. Dexter teaches the wherein said first control input is couple to said first differential transformer output and wherein said second control input is couple to said second differential transformer output [differential outputs to gate 310, 312, Fig. 3]. Nakano, Jin & Dexter fail to teach other features for this claim.

Souetinov teaches the 393 local oscillator drive circuit as the limiter which comprised a first differential transistor 401 having a first conduction path [collector terminal to emitter terminal of 401] and a first control input 340 to control a resistance of said first conduction path [the first control 340 controls the resistance of the conduction path from collector terminal to emitter terminal of 401];

a second differential transistor 402 having a second conduction path [collector terminal to emitter terminal of 402] and a second control input 341 to control a resistance of said second conduction path [the second control input 341 controls the resistance of the conduction path from collector terminal to emitter terminal of 402];

a first resistive element 410 coupled between said first conduction path [collector of 401] and a power supply terminal 440 [Fig. 4];

a second resistive element coupled between said second conduction path and said power supply terminal 440; and a current source 413 between said first and second conduction paths [the first & second paths from collector to emitter of 401, 402] and a ground terminal [Fig. 4, col. 3, line 66 to col. 4, line 30], in order to provide balance local oscillator drive signals to mixer, to reduce the noise from many resistors [col. 2, lines 8-14]. Therefore, it would have been obvious to one of ordinary skill in the art at the time of

invention to modify Nakano & Jin, Dexter with Souetinov's differential local oscillator drive circuit 393, in order to reduce the noise from many resistors.

Regarding **claim 6,** Souetinov teaches the wherein said first and/or second differential transistors comprises a bipolar transistor 401, 402.

Regarding **claim 7**, Souetinov teaches the wherein said first and/or second resistive elements comprises a resistor 410, 411.

6. Claims 14-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakano in view of Jin, as applied to claim 10 above, and further in view of Taylor et al.. (US 5,917,854).

Regarding **claim 14**, Nakano& Jin fail to teach an image reject filter to reject an image signal present in said received rf signal, wherein said image reject filter is coupled to an input of said mixer.

Taylor et al. (Taylor) teaches an image reject filter [5, Fig. 1, col. 3, lines 30-45] to reject an image signal present in said received rf signal, wherein said image reject filter is coupled to an input of said mixer [5 is coupled to the mixer 8, Fig. 1], to reject interference of the rf image signal [col. 1, lines 19-39]. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Nakano & Jin with Taylor's image reject filter, in order to reject the interference from image signal.

Regarding **claim 15,** Taylor teaches the IF filter 32 [Fig. 1] to remove undesired signals from said IF signal.

Regarding **claim 16**, Taylor teaches IF amplifier 10 to amplify said IF signal.

7. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nakano in view of Jin, as applied to claim 17 above, and further in view of Cheah (US 5,309,479).

Regarding **claim 21**, Nakano & Jin fail to teach an image reject filter to reject an image signal present in said IF signal, wherein said image reject filter is coupled to an input of said mixer.

Cheah teaches an image reject filter 3 to reject an image signal present in said IF signal, wherein said image reject filter is coupled to an input of said mixer [the image reject filter 3 coupled to the input of mixer 6, Fig. col. 3, lines 47-52; col. 4, lines 24-32], in order to improve spectrum purity of the transmitted signal [abstract]. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Nakano & Jin with Cheah's IF image reject filter 3, in order to improve spectrum purity of the transmitted signal.

Allowable Subject Matter

8. The following is an examiner's statement of reasons for allowance:

Claims 25-27 are allowable over the prior art of record. The prior arts fail to teach the allowable features, singly, particularly, or in combination.

Applicant has canceled claims 8-9, 24 and added new claims 25-27. The prior arts fail to teach the features, in claim 25, for an amplifier having **an gain variable with the amplitude of a signal applied to the amplifier**, together with

the amplifier responding to a signal comprising said first periodic signal and leakage of said second periodic signal by **providing a greater gain to said first periodic signal than to said leakage** of said second periodic signal, and responding to a signal comprising said second period signal and leakage of said first periodic signal by **providing a greater gain to said second period signal than to said leakage** of said first periodic signal, of an receiver, having

a first LO source to generate a first periodic signal;

a second LO source to generate a second **periodic signal;**

a first switching element to selectively coupled said first periodic signal to said amplifier input when said first switching element is turned on; and

a second switching element to selectively coupled said second periodic signal to said amplifier input when said second switching element is turned on;

said first and second switching elements allowing leakage of said first and second periodic signals, respectively, to said amplifier input when said first and second switching elements are off, respectively;

The dependent claims 26-27are also allowable due to their dependency upon the independent claims and the having additional claimed features.

The closest prior art from **Nakano (US 5,960,334)** teaches the switched local oscillator LO signals from source 4, 5 [Fig. 1] utilizing switch 23 having off isolation, and amplifier to provide larger gain for selected LO frequency and small gain for the small unselected leakage signal from switch 23 [col. 4, lines 2-40 & col. 5, lines 20-35],

but fails to teach the above allowable features, the amplifier having **an gain variable with the amplitude of a signal applied to the amplifier**, together with, **providing a greater gain to said first periodic signal than to said leakage** of said second periodic signal, and responding to a signal comprising said second period signal and leakage of said first periodic signal by **providing a greater gain to said second period signal than to said leakage.**

Wong et al. (US 6,952,572 B2) teaches the limiter 50, Fig. 7, enabled for high side, low side local oscillator signal injection [col. 4, line 52 to col. 5, line 22], for removing unwanted image signal [col. 1, lines 31-48], the differential pair has predetermined tail current flowing throw resistors 534, 535, controlled by current source 530, 531, but fails to teach the above allowable features, the amplifier having **an gain variable with the amplitude of a signal**

applied to the amplifier, together with, **providing a greater gain to said first periodic signal than to said leakage** of said second periodic signal, and responding to a signal comprising said second period signal and leakage of said first periodic signal by **providing a greater gain to said second period signal than to said leakage.**

Other prior arts in below has been considered, but they fail to teach the above allowable features.

Jin et al. (US 6,904,266 B1) teaches the a transmitter 20 comprising a second switching element 74 to selectively coupled said second local oscillator LO2 to an amplifier A3 or A4, col. col. 7, lines 1-20, Fig. 7], in order to attenuate the signal leakage [col. 2, lines 34-40].

Other prior arts are considered also, but they fail to teach the allowable features above. They are **Pierce (US 4006,353), Seitner (US 6,973,188 B1), Persico (US 5,574,755), Pengelly et al. (US 5,898,913), Dvorak (US 2004/0056,726 A1), Lin *US 2004/0002,320 A1), Kobayashi (Us 6,163,222), Yamao et al. (US 5,231,632).**

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Response to Arguments

9. Applicant's arguments filed 6/28/3002 have been fully considered but they are not persuasive.

Regarding applicant's argument for the no teaching of the limiter from prior art, Nakano-334, the claims 1-7, 10-23 are remaining in the rejection condition,

It is because in the independent claims 1, 10, 17, there is no further defined feature for the limiter that applicant argued about in page 8 of applicant amendment, 3/28/2006, for the

small frequency difference, $\Delta\omega$, between the first LO frequency and the second LO frequency; the limiting of large input signal.

Nakano's amplifier 6 does provide limiting effect, via tuning circuit, to providing large gain for the selected LO frequency signal & small gain for a small unselected leakage frequency signal leaked through switch 23 [the switch provides the isolation], as shown in claim 1 above, and this features is in applicant's specification [summary of invention, paragraph 0008 in page 3 & paragraph 0026 in page 6].

10. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Conclusion

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Charles C. Chow whose telephone number is (571) 272-7889. The examiner can normally be reached on 8:00am-5:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward Urban can be reached on (571) 272-7899. The fax phone number for the

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Charles Chow C.C.

May 23, 2006.

Nguyen Vo

5-26-2006

NGUYEN T. VO
PRIMARY EXAMINER